POSTSCRIPT.

DECEMBER, 1848.

The pamphlet to which this postscript is added, was printed last year, but not published till the present time. Apprehending the approach of ASIATIC CHOLERA to this country, I have in the mean time endeavored to make myself acquainted with its character and history. I do not affirm that the use of the *Safety Mask* and the precautions mentioned below, will protect persons from the poison of this pestilence, because it may be generated in the system by other than gaseous or air-wafted atoms, may be taken in food or drink—no body certainly knows. But if it is caused by a tabic state of the atmosphere itself, or by poisonous or poison-producing particles floating in the air, then the reasons presented in the pamphlet for the protective agency of the Safety Mask, apply with equal force to *Cholera*. Read and judge.

PRECAUTIONS AGAINST CHOLERA.

Recollect that *Ventilation* is recommended and practised on the supposition that the air without is purer and freer from poisonous atoms than the air within doors. Is this true when *Epidemics taint the air?* —when rooms are kept scrupulously clean and dry, the doors and windows guarded by gauze curtains, and anticeptic absorbing and neutralizing substances are constantly in the rooms, and no disease exists within? The object of ventilation is to render the breathed air purer.

Wear the mask when exposed to the open air. Keep close gauze curtains over windows and doors. Keep the room clean and dry. Have always a few pounds of dry charcoal and freshly slacked lime in your rooms. On entering, close the door and sprinkle two or three table spoonfulls of liquid chloride of lime on the floor, ten minutes before you take off the *Mask*. I need not say that the curtilage, the neighboring grounds and houses, should be kept as clean and dry as possible.

The opinions of Medical gentlemen, in regard to the protective agency of *this mask*, and of these precautions, are respectfully solicited.

I confidently rely upon the sense of justice entertained by the people of the United States, in regard to this American invention, and I look to them for a just remuneration for the use of the *Safety Mask*.

The description in the pamphlet will enable any person to make them.

The poor are invited to make and use them without fee or reward. Others wishing to manufacture, sell, or use them, will please apply by lettter, (post-paid,) to

JOHN LEWIS,
At Frankfort, Ky.

TO THE PUBLIC IN GENERAL,

AND

PHYSICIANS IN PARTICULAR.

That "an ounce of prevention is worth a pound of cure," applies in all its force to "The Safety Mask, or Prophylactic Protector," if it really is what its name imports.

This I shall show that it must be necessarily, unless all that is supposed and admitted to be true by medical men in relation to contagion, infection and miasma is false, and all the principles of Chemical Science in relation to affinity, unproved postulates, "lights that lead astray."

I shall, in the first place, give a description of the "Safety Mask," which is so extremely simple in its construction, that the most ignorant may understand it, and so easy of application that none can misapply it, or fail to perceive the nature of its use.

In the second place, I will give the reasons for its *protective agency*, and sustain them by facts and the opinions, practice and advice of the most learned and skilful Physicians, and successful experiments of the ablest Chemists.

First—The "Safety Mask" consists of a mask for the face, made of pasteboard, or any light, stiff material, rendered air tight on its surface by glue, size, varnish, or paint; to the outer rim or edge is sewed or glued a hood or head cover, also air tight, made of oiled silk or other material, so long that it will reach down to the shoulders. It is tied close around the neck with a string, bandage or neck cloth, so that the whole head and neck enclosed in this bag-like hood, are protected from contact with the atmosphere. Pellicles of plain glass cover the eye-holes of the mask, through which the wearer sees as well as if he had on no mask, while the air is excluded. Around the mouth and lower part of the nose, the mask, instead of fitting the face, projects two inches, forming a cyllinder, within which the nostrils and mouth are enclosed. If a common mask is used with a cyllinder adapted to it, care must be taken to make their juncture perfectly air tight, and the under and upper lips of the mask must be cut off, so as to give a breathing hole of an inch and three quarters within the cyllinder at the nostrils and mouth. The outer end of the cyllinder is covered with a very finely woven wire gauze cap, fitting over the end of the cyllinder like the top of a pill box, and which can be taken off and put on easily. Now, it is manifest that no air can reach the mouth or nostrils without passing though this wire gauze sifter. Within the cyllinder, and next to the wire gauze sifter, is a plate of porous charcoal, fitting the cyllinder like a stopper; another plate of charcoal like the first is further in the cyllinder, next to the nostrils and mouth. These plates should be the eighth of an inch thick or more. Between them is interposed a plate of well cleansed sponge, a quarter of an inch thick, also fitting the cyllinder. This sponge is moistened with diluted chloride of lime, or M. Labarraque's disinfecting soda or lime liquid, and any agreeable volatile oil. It is evident that the air entering the cyllinder, after passing through the sifter of wire gauze, must also pass through the

first plate of charcoal, then through the *medicated sponge*, and lastly through the second plate of charcoal, before it reaches the mouth or nose, while all other air is excluded not only from them, but from the face, head, hair and neck. The wood cut frontispiece represents the external appearance of the "*Safety Mask*," except that the engraver has made the cyllinder much longer than it need be.

The object is to exclude all atmospheric air, except that portion which is separated, sifted, purified, defecated, and rendered free from all impure and foreign matter, and every morbific condition of the air itself altered by chemical agency, before it reaches the mouth or nose, and before it can enter either or be inhaled. This object being accomplished by the "*Safety Mask*," and the rest of the person being protected by *clothes* and *long gloves*, there is no part of the system impressible by the direct or indirect mediate or immediate contact of morbific matter or tabic air that is exposed to their action. The plates of charcoal and the sponge may at any time be taken out and cleansed by plunging them into boiling water for a short time, and boiling water may be poured through the wire gauze of the cap of the cyllinder.

If any persons choose to incur the small additional expense of its construction, the cylinder may be of metal, with the wire gauze in one end and the interior surface of the other end cut into a screw adapted to a corresponding rim on the face of the mask. In this case there is no cap, the cyllinder itself answering all purposes; and this is more conveniently cleansed, by being unscrewed and the cyllinder, with its contents, thrown into boiling water, then dried thoroughly, the sponge impregnated, replaced, and the cylinder screwed on to the mask.

The manner of its use is so plain that scarcely a word of instruction is necessary. *Before* approaching persons, places or things (fomites) laboring under, or contaminated by any disease, such as small pox, measles, scarlatina or whooping cough, arising from the matter of *specific contagion*, put on the mask, and keep it on until you are again at a distance from them. *Before* entering unhealthy, infected or malarious districts, streets, alleys, hospitals, asylums, infirmaries, prisons, prison ships, or foul ships, dissecting rooms, anatomical theatres, and in short, any place or apartment where danger of disease is apprehended, put on the mask and keep it on till you return to your own apartment. Have a little fire kindled in it, close the windows and doors; have boiling water prepared to cleanse the mask; undress, after having sprinkled your gloves with chloride of lime, keep them on while dressing. Then take off and cleanse the mask by sprinkling its surface with chloride of lime, and the cyllinder and contents as directed; throw your clothing into boiling water, or sprinkle them piece by piece as you take them off, with chloride of lime, or subject them to 204 degrees of dry heat, Fahrenheit, and have them removed from the room, aired and washed. Being washed and dressed, take off the mask and gloves, cleanse the mouth. The most convenient method of avoiding all danger from *fomites*, and of protecting certainly the system of the sentient extremities of the body, and limbs, is to have a sack with sleeves, and pantaloons all in one piece, made of any cheap stuff and painted, to wear over the clothes. This should tie close around the neck and ankles. It is evident that thus protected, the clothes cannot become *fomitic*. This is easily cleansed, as clothes would be. Eat and drink (water is the natural and most healthful beverage,) temperately, avoid unnecessary fatigue and exposure to hot sun and damp night air and fogs, strong excitement, excess in all things, late hours and want of sleep.

To persons wearing "Safety Masks," many of these precautions may be unnecessary, but it is better to err on the safe side in regard to so precious a boon as health, and to be as well armed as possible when among the

formidable foes of human life that lurk unseen around us. True it is that these precautionary measures are troublesome and annoying, and the MASK is disagreeable to wear and very unbecoming, unfit to be worn at a Masquerade Ball. But the agonies of disease, the anguish of the heart, the burning brow and delirious brain, the darting pang of pain, the cold clammy chill that shakes the shuddering sufferer, the blue cold collapsed countenance, the scarred and pitted face, the protruded sightless eyeballs, are infinitely worse. I say nothing of purges, pukes, blisters, sinapisms, the lancet, gorget and the knife, intolerable lassitude, insatiable thirst, the untold horrors of unrefreshing restless sleep, with its fearful hallucinations and spectral forms that precede the sad and solemn hour of dissolution. That hour must come to all, to every one, but need not come in these "Gorgon terrors clad;" need not be precipitated in its arrival, or rendered doubly dreadful by the baneful breath of *contagion, infection or miasm.* Doctor Thomas D. Mitchell, a distinguished Professor in the Medical Department of Transylvania University, most truly and happily says: "This horror of contagion has done more to brutalize society, than almost any other fiend, save the sword. It has paralized commerce in all ages, and led man to abandon his own brother to disease and death."

So much descriptive of the "SAFETY MASK," its construction, application and use.

In the second place, I now proceed to give the reasons for its protective agency, and to sustain them by Facts, and the opinions, practice and advice of the most learned and skilful Physicians, and the successful experiments of the ablest Chemists.

Doctor Joseph Priestly, the discoverer of Oxygen Gas, on the 1st of August, 1774, in speaking of his discovery, and the assistance derived from his predecessors and cotemporaries in leading him to it before them, most beautifully and modestly remarks: "That when able navigators have, with great labor and judgment, steered towards an undiscovered country, a *common sailor* placed at the mast head may happen to get the *first sight* of land."

I may most emphatically use this language in relation to the invention of the "SAFETY MASK." And more humility becomes me than did become Dr. Priestly; for he was an able navigator on the sea of science, while I am indeed but a common sailor, whom circumstances sent to the mast head, and who fortunately, while there, happened to get the first sight of the land, to which able navigators have with great labor and judgment been steering. I therefore claim but little merit for this invention, while I believe it is one of great value to mankind. In the natural course of medical and chemical progress, it must soon have been arrived at by somebody else, had I not been so fortunate as first to find it.

Amulets and charms as prophylactic agents, have been used by the ignorant and superstitious and credulous from the earliest ages. Many of these were manifestly entirely inoperative and powerless, and others the children of imposture palmed upon the credulous, to gain power, fame or money. The sciolist and novices in medical practice honestly believing that they were promoting the cause of science and undeceiving mankind, discarded and decried all prophylactics. While experienced and skilful Physicians still used some of them, and will continue to do so, both to prevent the spreading of diseases, and to mitigate the violence of cases under treatment; in the latter case classing preventives and mitigants with curative means. They enjoin ventilation, the removal of offensive matter, the utmost attention to cleanliness of the apartment of the sick, of the bedding and the clothes of the patient. Some Physicians disregarding the sneers of their brother practitioners, on going into rooms where contagion or infection are doing their deadly work, wisely use prophylactics. Dr. Ewell says that "an eminent Physician belonging tc the Marine barracks of Brest, states that

previous to visiting the hospital, he was in the habit of introducing into his nostrils, sponge cut into a proper size and shape, moistened with some essential oil. He also kept in his mouth a piece of orange peel; and from this simple method he escaped several putrid and pestilential diseases, which in one year killed eleven Physicians and one hundred and thirteen students."

Lord Bacon, long ago said, "there are yet many things of excellent use to be discovered in the bosom of nature; and the number of *specifics* might be greatly increased by diligent investigation."

"Herman Boerhaave, of Leyden, not only declared, but proved, that all the knowledge we have is of such qualities alone as are discoverable by experience, or such as may be deduced from them by mathematical demonstration, that we are entirely ignorant of the principles of things." Aided by the light shed abroad by these great Philosophical luminaries, Scheele, much of whose useful life was spent amid inconvenience and distraction in sickness and sorrow, discovered *Chlorine*, then called Oxymuriatic Acid, and Henry Cavendish, Hydrogen, and the composition of water.

In 1773, Guyton Morveau invented the means of destroying infection in hospitals by *acid vapours*. And Mons. Labarraque conclusively demonstrated that a combination of Soda and Chlorine is completely efficacious in destroying infectious matter. The wire gauze of Sir Humphrey Davy's Safety Lamp, renders harmless the explosive energy of Hydrogen; and Dr. Thomas D. Mitchell says, "Let the vessel (a foul ship) be thoroughly cleansep of the foul bilge water, pumped out, and the atmosphere of the hold made to feel the purifying energy of Chlorine Gas, and you may freight her for a voyage, and man her with a full crew, and she will go and return with every sailor at his post." "The chemical agency of Chlorine on all gaseous compounds that contain *Hydrogen*, is to seize it and form a corresponding compound, while as a matter of necessity the original deleterious gas ceases to exist." "All ærial or gaseous matters that seem to have any power as agents in the morbific work, contain Hydrogen as an element or constituent." "We have *many facts* going to show the salutary agency of the chlorides, in reference to diseases of *infection*, as well as some that are confessedly *contagious*." Again, Dr. Mitchell says, "as some are no doubt wholly sceptical in regard to the agency attributed to the chlorides, we deem it proper to notice a fact that is matter of history. During the almost universal prevalence of *Typhus fever* among the poorer classes of Ireland, from 1816 to 1819, the operatives in a very large manufactory at Belfast, and all in the immediate vicinity, entirely escaped. The establishment is a great linen workshop for the bleaching process of which Chlorine was constantly in use. The surplus Chlorine escaping into the air, acted its part as a chemical agent, in decomposing all morbific gasses in the nieghborhood, whose presence contributed to the peculiar constitution of the air on which *epidemic fevers* so generally depend. Every one possessed of a small share of chemical information, is aware of the power of Chlorine to decompose Sulphuretted Hydrogen Gas, Carburetted Hydrogen, Phosphuretted Hydrogen, and other very offensive Gasses, into whose composition Hydrogen enters as a necessary constituent. The odor is at once destroyed, because the noxious gas ceases to exist. It is on the same principle that the chlorides diffused in chambers and other places, nullify all such gaseous compounds, which although too much diluted to be sensibly offensive, are capable of exerting a secret, yet powerfully pernicious influence."

The author of the treatise on Chemistry, published by the Society for the Diffusion of Useful Knowledge in England, of whlch society Mr. Brougham was the chairman, in speaking of Chloride of Lime, says, "*When a solution of the Chloride is exposed to the air, the Carbonic Acid gradually displaces the Chlorine, which slowly escapes into the atmosphere, and Carbonate of Lime is produced.* Advantage has been taken of this property for a most

beneficial purpose, and one which cannot be too widely published, or too urgently enforced by all those who may have it in their power to recommend it by precept or authority. Gaseous Chlorine possesses the power of destroying the volatile principles given off by bodies in a state of putrifaction, or infectious effluvia. Unpleasant exhalations are instantly neutralized by this salutary process, contagion checked, and a pleasant freshness communicated to the air, which does not merely cover disagreeable smells like common fumigation, but effectually destroys them. The Chloride of Lime, or Bleachiug Powder, is cheap and easily procured, and the quantity of a table spoonful stirred into as much water as may be contained in a soup plate, and renewed every two or three days, is quite sufficient in all ordinary cases. During fevers of a decidedly infectious character, the solution should be sprinkled about the chamber, and the linen of the patient thrown into a pail of water in which double the above quantity of the salt has been mixed. There is reason to believe from *actual exper.ment, that the contagion of the Plague itself* may be stopped by these precautions." The Carbonic Acid given out from the lungs by exhalation within the cyllinder of the mask, decomposes the Chloride, and carbonates are formed, the Chlorine is set free to unite with and neutralize all impurities within or entering the cyllinder, and thus the very act of breathing under ordinary circumstances, poisoning the air with Carbonic Acid Gas, and rendering it unfit for inhalation, becomes the means within the mask in the presence of Chlorides and Charcoal, of not only getting rid of the Carbonic Acid Gas, and rendering the air that was impregnated with it pure, and again fit for inhalation and oxygenating the blood, but also disengaging the Chlorine Gas to decompose, neutralize and render harmless and innocuous all morbific agents in the air within the cyllinder. The poison given out by the lungs made the agent of purifying and disinfecting also the air taken into them!

From the numerous experiments of Blumenback, Menzies, Lavoiser, Davy, Humboldt, Dumas, Allen, Pepys and Spallanzani, we may consider 77 parts in the hundred of Azote or Nitrogen, 22 of Oxygen and 1 of Carbonic Acid, as constituting atmospheric air, by a very near approximation. After respiration until they be no longer respirable, even by an insect, in place of the proportions above, the 100 parts are composed of 77 Azote and 23 Carbonic Acid. According to Menzies, 1–20 part of air *only once respired*, is Carbonic Acid. According to Dr. Goodwyn, 13–100; and all Physiologists maintain that the Carbonic Acid formed by respiration, is nearly, if not altogether, an equivalent of the Oxygen abstracted. It is therefore certain that the air in the cyllinder of the Safety Mask being more highly charged with Carbonic Acid, expired from the lungs, than the circumambient air, will decompose more Chloride, either of Lime or Soda, and set free more Chlorine Gas to unite with noxious matter, and purify the air passing into the mouth and nose. On this score alone, the protection by the Safety Mask is much greater than from fumigation or diffusion of disinfectants in the open air of apartments.

Such are the triumphs of chemical science, subjected and controlled by invention. Again the same distinguished chemist says, "In no case can it be productive of any injurious effects, (disinfection by Chlorides,) and he who is acquainted with *the facts*, is guilty of the grossest negligence who does not have recourse to such simple means of prevention, even in cases of the very slightest suspicion."

Dr. Eberle says, "The chronic contagious maladies are propagated exclusively by a palpable virus, and consequently always by *actual contact*. It must be observed, however, that though in a practical point of view we may properly adopt these distinctions *communicated by contact through the medium of the atmosphere, yet in reality an actual contact must necessarily occur between contagion and the individual before it can possibly paoduce disease,*

whether the contagion be a palpable matter or an imperceptible miasm, the only material difference consists in the mode in which this contact is effected. Considerable diversity of sentiment has been expressed in relation to the distance to which contagious miasmata may be dispersed from their source, in a state of sufficient activity to generate disease; that the sphere of their activity is very limited, however, has been abundantly demonstrated both by direct experiment and observation. *The most malignant contagions are rendered inert and harmless, by being diffused in the atmosphere,* and even by diffusion in the air of a well ventilated apartment. Ventilation diminishes the activity of contagious effluvia, simply by dispersing the miasm in a large portion of atmospheric air, in consequence of which those who become exposed to it receive it in weak and insufficient doses." Liebig says, "The atoms of poison are highly complex, and are held together by a weak chemical action, their complex nature renders them more liable to be changed by the agency of external causes, and thus to suffer decomposition. Any external agency, in many cases even *mechanical friction,* is sufficient to cause a disturbance in the equilibrium of the attraction of their constituents." Hence the effect intended to be produced by the wire gauze of the Safety Mask, in addition to its separating and sifting effect.

The poison of infection must come into actual contact with individuals to affect them, and also in some certain mass. Ventilation and distance prevent the latter, or rather may prevent it, but not the former. The wire gauze of the "Safety Mask" fulfils the functions of friction, ventilation and distance, while it also detains in some degree by attraction, vegetable and animal matter passing through it. Why it should, is not more strange than that while solar heat passes through glass, terrestrial radiant heat is arrested, and does not pass through it. Successive actions of matter in small masses, do not produce the effect of the impingement of a larger mass. The Prussic Acid in a peach leaf taken every day for fifty years, will not destroy life. The millionth part of a grain of calomel taken daily, will not salivate, nor the same portion of opium or morphine produce sleep. A sharp knife let fall on the naked foot wounds it, but reduced to powder, falling from even a greater height, does no harm. Leibig says, "It is certain that the action of contagions is the result of a peculiar influence dependent on chemical forces, and in no way connected with the vital principle. This influence is destroyed by chemical actions, and manifests itself wherever it is not subdued by some antagonist power. Its existence is recognized in a connected series of changes and transformations in which it causes all substances capable of undergoing similar changes, to participate." "All the characters of the phenomena of contagion, tend to disprove the existence of life in the contagious matters. They without doubt exercise an influence very similar to some processes in the living organism, but the cause of this influence is chemical action, *which is capable of being subdued by other chemical actions, by opposed agencies.* Several of the poisons generated in the body by disease, loose all their power when introduced into the stomach, but others are not thus destroyed. It is a fact very decisive of their chemical nature and mode of action, that those poisons which are neutral or alkaline, such as the poisonous matter of the contagious fever in cattle, (*typhus contagiosus ruminantium,*) or that of the small pox, loose their whole power of contagion in the stomach, whilst that of sausages which has an acid reaction, retains all its frightful properties under the same circumstances. In the former of these cases the free acid present in the stomach, destroys the action of the poison, the chemical properties of which are opposed to it, whilst in the latter it strengthens, or at all events does not offer any impediment to poisonous action." The chemical nature of poisons, and their want of vitality, I consider clearly established, otherwise their action on the system would be that of vitality op-

posed to vitality. Most fortunately for us, the principle of vitality controls the chemical action of very minute particles, in assimilating and formative processes, and resists all disturbances of the normal action of the organism by minute particles of poison, even in ærial form, and prevents the occurrence of death from every breath we draw, and every morsel of food and draught of liquid which we swallow.

Certain masses for a certain time must come in contact with the system to impress it beneficially or injuriously. Dr. Haygarth is of opinion that the malignant forms of variolous diseases do not extend their infectious influence beyond a few yards from the source of the poison, and that the contagion of fever is confined to a much narrower sphere than that of small pox.

Dr. Clark thinks that malignant fever does not render the atmosphere infectious further than a few feet from the contagion, preserved in clothes, furniture, &c., and daily observation confirms the opinion, he remarks, that a person must remain a considerable time within the sphere of infection to receive it. But Dr. Brown intimates that sound induction does not warrant these restrictions of the sphere of contagion. And he is of opinion that when the epidermis is entire, the absorbing power of the cutaneous surface is so very feeble, and its nerves are so protected by an inert covering, that it is probable that gaseous matters of a noxious nature rarely act in this way. Dr. Brown's opinion that contagious diseases are not taken through the skin unless the skin is broken, receives additional weight from the facts, that persons handling or skinning glandered horses, never take the disease except some leision of the hands, or other parts of the system coming in contact with the virus, exists. And medical students, in dissecting dead bodies, are not affected by the contact of virulent matter, unless accidentally inoculated through some sore or wound. In either case, the matter is not absorbed through the unbroken epidermis by the nerves of the skin.

Dr. Jackson thought that the first impression, from infectious matter diffused in the atmosphere, is made on the alimentary canal taken in by the mouth; but this can be true only of those poisons which have an acid reaction. But, says Dr. Brown, the most ready access for atmospheric poisons to the system is afforded by the air passages, and, indeed, the experiments of Nysten and Edwards have proved that Hydrogen, Azote, and other gasses, are rapidly absorbed by the lungs, and analogy would lead us to attribute a similar susceptibility to contagious and other miasmata. The Safety Mask guards and protects the entrances of the air passages and of the alimentary canal, and prevents the access of noxious and morbific matter to the adits of both of them.

I have already mentioned the agency of the Chloride of Lime, and the Carbonic Acid Gas of the exhaled breath, in purifying the air in the cyllinder, and setting free the Chlorine Gas, to unite with and neutralize, by decomposition, any morbific agents *in* or *of* the atmosphere, leaving the inert and harmless Carbonate of Lime. The sponge, though besides being the recipient of the Chloride and volatile aromatic, acts as an air strainer of great power. A wheat thresher in this country advises all those engaged in threshing and fanning wheat, to tie a moistened sponge over the mouth and nose, declaring, from his own experience, its power to intercept all dust and filth, and to render the air pure and pleasant.

Of the charcoal plates, the effect will be obvious to every Chemist and Physician; indeed, every old woman knows the antisceptic properties of charcoal. It retains Hydrogen with great obstinacy, and has the property of absorbing a considerable quantity of the different gaseous bodies, amounting in some cases to eighty or ninety times its own volume. It will absorb one and three quarter times its own volume of Hydrogen, and

ninety times its own volume of ammoniacal gas. It resists the putrefaction, and destroys the color and smell of many animal and vegetable substances; it exercises a strong attraction on putrid molecules and infectious effluvia. Its antisceptic properties are well established by the experience and practice of medical men, and its destructive effects on offensive smells, leads to the conclusion that it exercises as great a power on ærial forms of putresence as on any others. In the cyllinder of the Safety Mask, all air, before reaching the nose or mouth, must pass through the pores or over and in contact with the surface of charcoal, itself infusible and insoluble in any known menstruum. It will be supposed that breathing through so many screens must be difficult and laborious. Experiment, however, at once proves that such is not the case. A single trial dissipates this delusion, and proves that no serious inconvenience is experienced.

Dr. Robley Dunglison, in treating of disinfectants as curative agents, remarks, that "charcoal probably exerts its efficacy altogether on the first passages, and through them on the rest of the economy. It is difficult to conceive that it can act through the medium of the circulation, whilst the chlorinated preparations, creosote, &c., produce their effect in the compound mode above described." Again, "Chlorine in vapour has been inhaled in gangrene of the lungs, in which it has been found to correct the fetor of the breath and expectoration, and to be therefore calculated to obviate not only the local, but the constitutional symptoms."

Dr. Joseph Brown says of charcoal, "This substance, as is well known to chemists, possesses the property of absorbing gasses, and *might on this account be advantageously employed to rid a limited portion of air of Hydrogen or other offensive matter with which it is impregnated. It has not, however, been employed in this way.* But the utility of charcoal filters in divesting *water* of any gasses, the products of animal or vegetable decomposition with which it is contaminated, has long been recognised."

In the SAFETY MASK it is used to rid a limited portion of air of noxious gasses and morbific matter floating in *the limited portion* that enters the cyllinder of the mask on its way to the mouth and nose. As early as 1773, Guyton Morveau used Muriatic Acid to disinfect the Church at Dijon from the emanations from the vaults below. *Nitrous Acid* fumigations were first used in England for disinfecting purposes by Dr. Carmichael Smyth, on whom a Parliamentary grant was bestowed. To Fourcroy belongs the merit of first proposing Chlorine as a disinfecting agent; in 1791, Cruikshank and Morveau thought it preferable to all other acids, and it has since united most suffrages in its favor. But the irritating effect of *undiluted* Chlorine on the bronchial lining, has caused it, in occupied apartments, to be used in a diluted form, or to be superceded by the liquid forms of Mons. Labarraque—the one of Lime, the other of Soda. Chemists do not agree as to the precise nature of these compounds. But the manner and materials of their formation are well known, and their powerfully disinfecting agency is acknowledged and used by innumerable scientific persons of various nations, whose testimony is loud in their favor. Labarraque's disinfecting Soda Liquid is a compound of Soda and Chlorine, and is thus made—dissolve 2,800 grains of christalized Carbonate of Soda in 1 28-100 pints of water, and through the solution, placed in Wolf's apparatus, transmit the Chlorine evolved from a mixture of 967 grains of sea salt, and 750 grains or per Oxide of Manganese, when acted on by 967 grains of Sulphuric Acid, diluted with 750 grains of water. That of Lime is as follows: Introduce into a common retort, 14 parts of black Oxide of Manganese, 6 parts of Muriate of Soda, the same proportion of Sulphuric Acid, and 12 parts of water. The Chlorine gas will rise without the application of heat, (though heat may be employed to accelerate the operation,) and should be transmitted through a tube attached to the neck of the retort to the bottom of a vessel filled with

a saturated solution of lime. When this is saturated with Chlorine, the test of which is the cessation of the evolution of gas from the materials in the retort, it contains about twenty per one hundred of this principle, and may be diluted with forty parts of water, added just before employing it. The liquid Chloride of Soda should be diluted with only thirty parts of water when used. I prefer the Chloride of Lime to that of Soda, in the Safety Mask, although they are both decomposed by the Carbonic Acid of the breath, and the Chlorine liberated; yet the decomposition of the Chloride of Soda is slower, in consequence of the solidity of the salt produced. More repeated experiments, however, may cause me to discard this preference, and to consider them of equal value in the cyllinder of the Safety Mask.

The unpleasant smell of Chlorine may, in some degree, be obviated by volatile oils, or by dilution with aromatic liquids, yet persons may be assured, from experience and the highest medical authority, that there is nothing pernicious to life in the smell of the disinfecting liquids directed to be used in the Safety Mask.

Justus Liebig, certainly among the ablest chemists of the present day, the most distinguished if not the most able, says: "Chemical actions are propagated in no organs so easily as in the lungs, and it is well known that diseases of the lungs are, above all others, frequent and dangerous. The chemical process of slow combustion in the lungs, is accelerated by all substances in a state of decay or putrefaction, by ammonia and alkalies; but it is retarded by empyreumatic substances, *volatile oils and acids*. Sulphuretted Hydrogen produces immediate decomposition of the blood, and Sulphurous Acid combines with the substance of the tissues, the cells and membranes.

"Ammonia is very generally produced in cases of disease. It is *always* emitted in those in which *contagion* is generated, and is an invariable product of the decomposition of animal matter. The Ammoniacal Salts also, which are obtained by the evaporation of rain water, after an acid has been added, when treated with lime so as to set free their Ammonia, emit an odor most closely resemblihg that of corpses, or the peculiar smell of dunghills. Smell itself may, in many cases, be considered as a reaction of the nerves of smell, or as a resistance offered by the vital powers to chemical action.

"By evaporating acids in air containing gaseous contagions, the Ammonia is neutralized, and we thus prevent further decomposition, and destroy the power of the contagion, that is its state of chemical change. Chlorine is a substance which destroys Ammonia and organic bodies with much facility. Carbonic Acid and Sulphuretted Hydrogen, which are frequently evolved from the earth in cellars, mines, wells, sewers, and other places, are amongst the most pernicious miasms. The former may be removed from the air by alkalies, the latter by burning sulphur, (sulphurous acid,) or by the evaporation of Nitric Acid."

The reason why disinfectants used in rooms, streets or alleys, do not always succeed in preventing persons from taking diseases in them, or in other *places* where they are used, and why the Safety Mask affords absolute immunity from morbific agents in the air, will be manifest from the following considerations: They can only neutralize and purify a limited quantity of air. The air entering at doors and windows, or passing through streets and alleys, may be, and often no doubt is, too great, and too frequently replaced by other volumes of infected air; in the case of epidemics, malignant and contagious fevers, extending through apartments, alleys and permeating streets, and the effluvia of the dying and the dead, and of the recrements of the wretched inhabitants crowded together in confined places. There are currents constantly produced, counter-currents and eddies in the atmos-

phere of rooms, as well as in the open air. The disinfected air may be swept away or swallowed up in these, and persons may enter the space before the infected current, counter-current, or eddy has been rendered pure by the subsequent action of the disinfectants; or the quantity of infected air may exceed the power of neutralization in the disinfectants, from mere excess of volume. Is it not absolutely certain that the air breathed under such circumstances may be in an infected state? Is it absolutely certain that it has been subjected to neutralizing disinfection? On the other hand, is it not certain that those who breathe through the apparatus and disinfectants of the Safety Mask, can breathe only neutralized and disinfected air. Besides, the Safety Mask makes the security of every individual wearing it to depend on his own precautionary prudence, and not on the carelessness or reckless imprudence of others. And all fomites produced by this process may be rendered innocuous by the action of boiling water, or by dry heat of 204 degrees of Fahrenheit's thermometer. The experiments of Dr. Henry, of Manchester, leave no room for doubt on this subject.

And now I appeal not only to Medical gentlemem and Chemists, but to the common sense of common men, to say if the SAFETY MASK will not fulfil the conditions predicated of it, unless the facts, principles and reasons stated in this pamphlet are false, unsound and utterly fallacious? And if they are, there can be no faith in Physicians, no principles established in Pneumatic Chemistry, and no trusting to the deductions of human reason, from the plainest facts and the experience of most trustworthy men. I can only say for myself, that with one of these masks on, I should fearlessly go into the midst of small pox, typhus or yellow fever, scarlatina, ship fever, or the Miasm of the Pontine Marshes itself. It has been suggested by a Medical gentleman of high attainments, to whom I communicated the plan and general principles of this invention, that it may be advantageously used, not only as a prophylactic, but a curative agent in diseases of the first passages and of the lungs.

Chemists and other persons acquainted with chemical affinities, would conclude, *a priori*, as to the effect of the cyllinder of the Safety Mask and its contents, on atmospheric impurities passing into it. But a single experiment will satisfy the most ignorant or incredulous as to their effect. The most disagreeable and noxious smells, animal and vegetable, proceeding from putrid flesh, excrements, bruised Tomato leaves, or Jamestown weed, are arrested, decomposed, or neutralized, thus manifesting conclusively the prophylactic power of the Mask. And it is rational to infer that, in a similar manner, those deleterious particles and chemical compounds which propagate contagions, infections and miasmatic diseases, although making no perceptible impression on the olfactories, are arrested, decomposed or neutralized.

It might be well for persons suffering with Asthma, Dyspnoea, &c., under the direction of a skilful Physician, to try the effect of the Safety Mask with such substances in the cyllinder as he might prescribe. In Bronchial affections and incipient Catarrhal complaints, and in the first stages of Phthisis, the Mask may, in the hands of judicious practitioners, effect beneficial results, by modifying the air with certain substances before it reaches the mouth and nose, and by excluding all other atmospheric influences from these adits to the interior surfaces. It affords the means of applying evaporable medicines directly to the surfaces of the air passages, throat and lungs.

This is no patent or unpatented *Medicine*, and if it should not save the life of a single human being, I shall have the consolation of knowing that it cannot take the life of any who shall use it. No victim, by its use, will have fallen a sacrifice on the altar of Empyricism in the regular or irregular practice of Medicine, nor will it produce or prolong a single pang to a single sufferer languishing on a bed of sickness.

List of authorities and works used in the compilation of this pamphlet or quoted in it:

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Menzies,
Lavoisier,
Pepys,
Dumas,
Spallanzani.

☞Proposals for the purchase or use of the right to this invention, *post paid*, may be addressed to me at Frankfort, Kentucky.

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Of Llangollen.